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Climb to new heights by controlling your PLCs over the Internet

By Kirt Phillips, Michael Gibson, and Pim Little

Run your application from anywhere with just a TCP/IP connection to the Internet.

The Internet broadens control and automation possibilities. As manufacturers develop hardware and software that comply with TCP/IP standards, automation climbs to new heights. These new systems allow engineers to take an application from one location to the next without modification. Applications can be run at the home office, the corporate headquarters, a customer site, or on the road with only an established TCP/IP connection to the Internet.

Today, many programmable logic controllers (PLCs) are available with communications coprocessor modules. Some PLCs have all communications options built into either the central processing unit (CPU) or the power supply. Others offer basic communication through the CPU or power supply but allow a communications coprocessor module to be added for more sophisticated options. Most controllers offer various types of serial networks to permit communication to a client computer or peer-to-peer communications between PLCs.

Since communication protocols vary for most brands of controllers, engineers must develop or purchase software drivers. In some cases, the performance of these networks is an issue because update times may be several seconds on a full network. When dealing with serial networks, individual manufacturers may impose additional restrictions. For example, certain PLCs will only allow eight nodes on a network instead of 32.

Another important issue is remote connectivity. Currently there are several ways to connect remotely to a serial network. Unfortunately, most involve direct or indirect modem connections, which greatly reduce performance. One way to connect remotely to a PLC on a serial network is via direct modem connection. A modem is taken to the control panel and cabled directly to one PLC's programming port. A telephone line must be available to the modem at this location. At this point, the remote user can dial directly into the PLC using the software available with the PLC programming package. Usually, the user will not have access to other PLCs on the serial network.

Remote access to PLCs is also possible through remote control of a central computer. Suppose the central computer is running a monitoring software package. With remote-control software, a user can remotely dial in to the central computer. When control is established, the

With automation online, an expert at a remote location can guide an engineer through technical problems, saving time and travel costs.

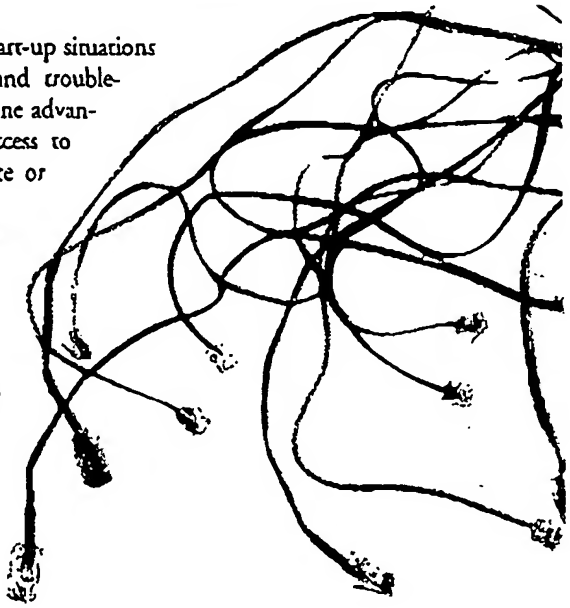
remote user may use the central computer as if it was local. This has the disadvantage of monopolizing the local computer and rendering it unavailable to local users. A significant loss of performance also occurs due to the amount of information being transferred over the modem. A modem must be set up and ready to answer when the remote user wishes to initiate a session. In many cases, this requires an action by the local user or prior coordination. Both methods require dedicated modems and new connections established for each session.

One solution to ease network setup and remote access is to make the PLC available on a standard computer network. To achieve this goal, a communications module must be available to interface with such a network. Recently, such modules have come to the market. When considering network installation costs, note that there is a much larger base of competent installers of Ethernet networks than of serial networks. Ethernet modules are now available for certain high-end and mid-level PLCs. Some of these modules are TCP/IP compliant.

An Ethernet module can be incorporated into a standard PLC configuration as a communications coprocessor. The module consumes a known amount of PLC resources and is fully configurable. Once the module is installed and configured by the PLC software, it should be recognized by the CPU. Individual manufacturers may impose restrictions for the physical location of this module in the backplane.

To achieve maximum benefit from a PLC network, integrate it into the local facility's network, the companywide intranet, or the Internet. When the system is designed, incorporate the PLCs as if they are ordinary nodes on the network. In fact, these PLCs are simply more computers on the network. After the PLCs are installed, configured, and connected, they may be accessed over the network. They behave like any standard TCP/IP-compliant device. Conversations can be established among the PLCs and any other devices on the network whether the devices are on the local-area network, the companywide intranet, or even the Internet.

Because an Ethernet module is another computer on the network, remote software may treat it just like another computer. The software communicating to the PLC must use the appropriate interface language required by the PLC to retrieve information. For example, assume a PLC is connected to its native programming software. In this case, after any security requirements are met, the user is online with the PLC. The program may be stopped or started, logic can be observed or modified, start-up situations can be monitored remotely, and troubleshooting is more convenient. One advantage of this arrangement is access to many systems from one remote or centralized location.



Many computer users are familiar with Web browsers for moving from one site to another. Typically, to go to a site, a user types the name of the desired server and waits to be connected. The application sends a message through TCP/IP requesting to connect to the location. TCP/IP finds the address of the name server and requests the IP address for the location specified from the name server. Once a connection is open, data may be sent back and forth. In a Web browser, the Web-page text, link addresses, and graphics are uploaded. Commands, keystrokes, mouse movements, and clicks are downloaded. Files may be copied, locations may be marked, and graphics may be saved. After connection is established, these actions are virtually transparent to the user.

Custom applications can be written to take advantage of the Internet or intranet. Applications composed in languages such as Visual C++ or Visual Basic lend themselves to this structure. These languages have many tools and options available to take advantage of TCP/IP-compliant systems (e.g., Java, CGI, HTTP, HTML, and Internet database connector). Use of these scripting tools and protocols allows development of powerful applications. The full advantage of customization is only realized when considering the implications of the portability of these applications.

Control and automation hardware such as PLCs and smart field devices can greatly benefit from Ethernet communications. Ease of communication, performance, and setup, as well as reliability and convenience, make Ethernet communications an excellent alternative to standard serial networks. If a user is concerned about connectivity, TCP/IP-compliant Ethernet communications are an appropriate interface for providing universal connectivity. The power of the Internet in monitoring and troubleshooting cannot be overstated. The Internet is definitely a viable medium for control and automation that many users are already taking advantage of today. IT

Behind the byline

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